

### REMARKS

Claims 1-53 are pending in the present application, with Claims 33-45 and 51 withdrawn from consideration. The Examiner has maintained the rejection of Claims 1-32, 46-50, 52 and 53 as being anticipated by Gates et al. (U.S. Patent No. 6,203,613). Claims 1, 14, 15, 20, and 52 clearly indicate that a metal oxide is formed by multiple ALD cycles. That is, in each ALD cycle metal oxide is deposited but *not reduced* and the ALD cycles are repeated until an oxide of the desired thickness has been deposited. Because metal oxide is deposited but not reduced in multiple cycles, this results in a metal oxide layer with a thickness that is greater than a single layer of adsorbed reactant. This metal oxide layer is reduced after the multiple ALD cycles are complete, as clearly indicated in the claims. Thus, reduction does not occur in each ALD cycle, but only after multiple ALD cycles. This is very different from a situation in which a metal oxide is deposited *and* reduced in each of a number of ALD cycles, as in the Example in Gates pointed to by the Examiner in support of the rejection.

In response to Applicants' previous arguments, the Examiner states that "Gates clearly discloses depositing a metal oxide layer (Col. 11, l. 36; step 3 of the ALD cycle (iron nitrate)) by 200 ALD cycles (Col. 11, ll. 44-45) by reduction of the metal oxide (Col. 11, ll. 38-39); steps 4 and 5 of the ALD cycle (inert purge-hydrogen))." The Examiner concludes that Gates clearly discloses the features of the claims. Applicants strongly disagree. Rather, this section of Gates discloses a process in which metal oxide precursor is reduced to metal in each ALD cycle. While iron nitrate is adsorbed on the substrate in each ALD cycle, there is no deposition of a metal oxide by multiple ALD cycles as claimed.

First, the Examiner refers to Col. 11, line 36 (step 3 of a disclosed ALD cycle) for the deposition of a metal oxide layer. Applicants note that this line refers to a single pulse of iron nitrate precursor within an ALD cycle. It does not refer to a complete ALD cycle for depositing iron nitrate. In particular, line 36 referred to by the Examiner indicates the provision of the iron nitrate precursor to the reaction chamber for 0.5 seconds. Thus, no metal oxide is formed by multiple ALD cycles in this step. Rather, a single layer of iron nitrate is absorbed as part of a single ALD cycle.

The Examiner next refers to 200 ALD cycles in Col. 11, ll. 44-45. This section of the Gates reference refers to the deposition of the iron manganese (FeMn) alloy and not to the

Appl. No. : 09/997,396  
Filed : November 28, 2001

deposition of iron nitrate. This is quite clear from the sentence referred to by the Examiner which states "the desired thickness of the *FeMn alloy* was 10 nm, thus 200 cycles were used." Again, this does not teach or suggest depositing metal oxide by multiple ALD cycles.

The Examiner then goes back to Col. 11, line 38-39, steps 4 and 5 refers to reduction of the metal oxide. These steps refer to an inert purge and a hydrogen pulse for reducing the adsorbed metal nitrate within a single ALD cycle. That is, in this example in Gates a single pulse of iron nitrate is allowed to adsorb to the substrate and is subsequently reduced in each cycle and not after multiple cycles. The 200 ALD cycles referred to by the Examiner is, again, directed to the entire ALD process for depositing iron manganese alloy. In each of the ALD cycles, iron manganese alloy is formed, not a metal oxide. This does not teach or suggest depositing a metal oxide layer by multiple ALD cycles (in each of which the deposited metal oxide is not reduced), followed by reduction of the metal oxide layer as claimed.


In summary, the Examiner has suggested that iron nitrate is deposited by 200 ALD cycles and subsequently reduced. This is not what is taught or suggested in Gates. To the contrary, iron nitrate is reduced in each of 200 ALD cycles in the process cited by the Examiner in Example 8 of Gates. Thus, Gates does not suggest first depositing a metal oxide layer by repeating an ALD cycle multiple times (without reduction of metal oxide) and then reducing that deposited metal oxide layer to elemental metal.

Because Gates does not teach or suggest all the features of the claims as discussed above, Applicants submit that the rejection of the claims as anticipated by Gates should be withdrawn and the application moved to allowance. If any issues remain, the Examiner is cordially invited to contact Applicants' representative at the number provided below in order to resolve such issues promptly.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: March 23, 2006

By: 

Andrew N. Merickel  
Registration No. 53,317  
Attorney of Record  
Customer No. 20,995  
(415) 954-4114